REMARKS

Applicants acknowledge receipt of an Office Action dated August 19, 2008. In this response, Applicants have amended claims 1-8 and 10-13 and have added new independent claim 14 above. Claims 6, 8, 12, and 13 have been rewritten in independent form, and claims 2-5, 7, and 11 have been amended to replace the phrase "characterized in that" with the conventional term "wherein". Following entry of these amendments, claims 1-14 are pending in the application.

Applicants respectfully request reconsideration of the present application in view of the foregoing amendments and in view of the reasons that follow.

Allowable Subject Matter

As an initial matter, Applicants acknowledge, with appreciation, the PTO's indication that claims 6-8 and 12-13 would be allowable if rewritten in independent form. In this response, Applicants have rewritten claims 6, 8, 12, and 13 in independent form. In view of these amendments, Applicants submit that each of these claims is now in *prima facie* allowable form.

Rejection Under 35 U.S.C. § 102

On page 2 of the Office Action, the PTO has rejected claims 1-5 and 9-11, under 35 U.S.C. § 102(b) as allegedly being anticipated by U.S. Patent 6,126,713, Igarashi *et al.*, (hereafter "Igarashi"). Applicants traverse this rejection for the reason set forth below.

A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference. *Verdegaal Bros. v. Union Oil Co. of California*, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). See generally MPEP § 2131.

Present claims 1 and 10 are directed, respectively, to a method and a system for a process for quantitatively evaluating a graphite structure of a gray cast iron by image analysis. The process includes the step of (a) "analyzing a magnified image of the graphite structure to extract non-spherical graphite pieces having sizes within a first range, contained in the graphite structure to calculate a number of the extracted non-spherical graphite pieces", (b)

"calculating a thick and thin degree expressing a representative degree of thickness of the non-spherical graphite pieces", and (c) "outputting the calculated number and thick and thin degree of the non-spherical graphite pieces in combination as an evaluation result".

The invention of currently pending independent claims 1 and 10 relates to gray cast iron which has a high content of non-spherical graphite such as, for example, flake-like graphite and eutectic graphite. Gray cast iron is quite different from spheroidal graphite cast iron which has a high content of spherical graphite. In other words, the invention of currently pending independent claims 1 and 10 is intended to evaluate the graphite structure by analyzing *non-spherical* graphite pieces in the graphite structure and, accordingly, does not evaluate the graphite structure by analyzing spherical graphite pieces.

The presently claimed step (b) of calculating the thick and thin degree comprises:

"measuring a maximum length and an area of each of the non-spherical graphite pieces having maximum lengths within a second range, included in the extracted non-spherical graphite pieces,"

"determining an area of a non-graphite piece having a median value of the maximum lengths within the second range depending on the calculated maximum lengths and the areas," and

"dividing the determined area by the median value to obtain the thick and thin degree".

With the process of independent claims 1 and 10, the graphite structure of the gray cast iron can be effectively quantitatively evaluated by using the number of the non-spherical graphite pieces and the thick and thin degree of the non-spherical graphite pieces. This is accomplished numerically, easily, and accurately. Accordingly, this process can provide highly reliable evaluation results without differences between individuals and the actual graphite structure can be easily obtained from the evaluation results.

It is to be noted that calculating the thick and thin degree of the non-spherical graphite pieces is important in order to understand the state of the graphite structure of the gray case iron which has a high content of non-spherical graphite pieces.

Turning now to the cited reference, Igarishi relates to spheroidal graphite cast iron and discloses counting the number of spherical graphite particles having maximum diameters larger than 5 μm, and measurement of the graphite spheroidization ratio under the NIK

method which was proposed by Nippon Imono Kyokai (Japan Cast Iron Association) in Japan. The measurement of the graphite spheroidization ratio was accomplished as follows: First, graphite particles in a spheroidal graphite cast iron were classified into 5 groups, and certain area ratios and certain shape factors as shown in Table 2 were assigned to the 5 groups. Then, a calculation was made using an equation shown at column 12, lines 17 and 18. The calculation was repeated on five fields, and an arithmetic mean of the results of the calculations was employed as the graphite spheroidization ratio.

In the Igarashi's counting and measurement, the object to be evaluated was *spheroidal* graphite cast iron highly containing spherical graphite particles. Therefore, it is a matter of course that spherical graphite particles are counted and subjected to the graphite spheroidation ratio measurement.

In contrast, in the invention of present independent claims 1 and 10, the object to be evaluated is gray cast iron with a high content of *non-spherical* graphite pieces. Therefore, non-spherical particles are counted and subjected to analysis for obtaining the thick and thin degree.

Additionally, in Igarashi's counting and measurement, the measurement of the graphite spheroidization ratio is an important matter.

In contrast, in the invention of present independent claims 1 and 10, the measurement (calculation) is of the thick and thin degree of the *non-spherical* graphite pieces. It is to be noted that the thick and thin degree is particular to gray cast iron which has a high content of non-spherical graphite pieces and, therefore, is not related to spheroidal graphite cast iron.

The measurement of the thick and thin degree (expressing a representative degree of thickness of the non-spherical or flake-like graphite pieces) is quite different from the Igarashi's graphite spheroidization ratio (expressing a representative degree of spheroidization of spherical graphite particles). This is clear from the fact that the Igarashi's counting and measurement never includes the particular three sub-steps (measuring a maximum length and an area of each of non-spherical graphite pieces.... determining an area of a non-graphite piece having a median value ..... , and dividing the determined area by the median value to obtain the thick and thin degree) in the step (b) of the claimed process.

Thus, the Igarashi's counting and measurement are quite different from the graphite structure evaluating method according to the presently claimed invention.

In view of the foregoing, Applicants respectfully request reconsideration and withdrawal of the outstanding rejection under § 102.

Newly Added Claim 14

In this response, Applicants have added new independent claim 14. Applicants submit that none of the references cited in the outstanding rejections, whether taken individually or in combination, teach or suggest "A method for quantitatively evaluating a graphite structure of a gray cast iron by an image analysis apparatus, comprising the steps of analyzing a magnified image of the graphite structure to extract non-spherical graphite pieces contained in the graphite structure to calculate a number of the extracted non-spherical graphite pieces, the extracted non-spherical graphite pieces having at least one of areas each of which is equal to a circle having a diameter of 5 μm or more and maximum lengths of 10 μm or more; calculating a thick and thin degree expressing a representative degree of thickness of the non-spherical graphite pieces, including measuring a maximum length and an area of each of the non-spherical graphite pieces having maximum lengths ranging from 50 μm or more to less than 150 μm, included in the extracted non-spherical graphite pieces, determining an area of a non-graphite piece having the maximum length of 100 μm depending on the calculated maximum lengths and the areas, the maximum length of 100 μm being a median value of the maximum lengths, and dividing the determined area by 100 to obtain the thick and thin degree; and outputting the calculated number and thick and thin degree of the non-spherical graphite pieces in combination as an evaluation result."

CONCLUSION

Applicants believe that the present application is now in condition for allowance. Favorable reconsideration of the application as amended is respectfully requested.

The Examiner is invited to contact the undersigned by telephone if it is felt that a telephone interview would advance the prosecution of the present application.

The Commissioner is hereby authorized to charge any additional fees which may be required regarding this application under 37 C.F.R. §§ 1.16-1.17, or credit any overpayment, to Deposit Account No. 19-0741. Should no proper payment be enclosed herewith, as by a check or credit card payment form being in the wrong amount, unsigned, post-dated, otherwise improper or informal or even entirely missing, the Commissioner is authorized to charge the unpaid amount to Deposit Account No. 19-0741. If any extensions of time are needed for timely acceptance of papers submitted herewith, Applicant hereby petitions for such extension under 37 C.F.R. § 1.136 and authorizes payment of any such extensions fees to Deposit Account No. 19-0741.

Respectfully submitted,

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